

INCLINOMETER (TILT SENSOR)

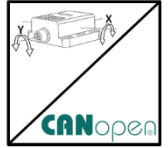
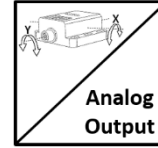
“Analog or CANopen Output”

INC 110



GENERAL FEATURES

- $\pm 90^\circ$ dual axis measurement range or 0-360° single axis measurement range option
- 4-20 mA, 0-5V, 0-10V or CANopen signal output option
- Compensated axis sensitivity
- High Sensitivity : $\pm 0.2^\circ$
- Ability to specify 0° point
- Easy installation
- IP67 protection class
- Small and robust housing
- Compact structure



HM 2303

INC 110 series inclinometers are used for inclination measurement for single or dual axis. They have $\pm 90^\circ$ dual axis and 0-360° single axis measurement range. These sensors with 0-5VDC or 0-10VDC voltage output, 4-20mA current output or CANopen signal output option, can take measurement with $\pm 0.2^\circ$ accuracy. Thanks to its compensated axis sensitivity, the effect of the axes on each other is minimized.

These sensors, especially used in machine and crane industries, can operate in outdoor environments with their high IP protection classes.

TECHNICAL SPECIFICATIONS

Supply Voltage	4-20 mA & CANopen: 12...24 VDC 0-10 VDC & 0-5 VDC: 15...24 VDC	Protection Class	IP67
*Measurement Range	Single axis: 360° Dual axis: $\pm 90^\circ$	Operating Temperature	- 30°C ... +70°C
*Measurement Axes	X, XY	Relative Humidity	%10 ile %90
*Output Signals	Analog 4-20 mA, 0-5VDC, 0-10 VDC CANopen	Weight	~140 gr
Response Frequency	10Hz	Body Material	Aluminium
Resolution	For Analog models: 12 bit For CANopen models: 0.05°	*Electrical Connection	Analog models: M12 5 pin (male) socket or cable output CANopen models: M12 5 pin (male) and M12 5 pin (female) socket
Accuracy	$\pm 0.2^\circ$		

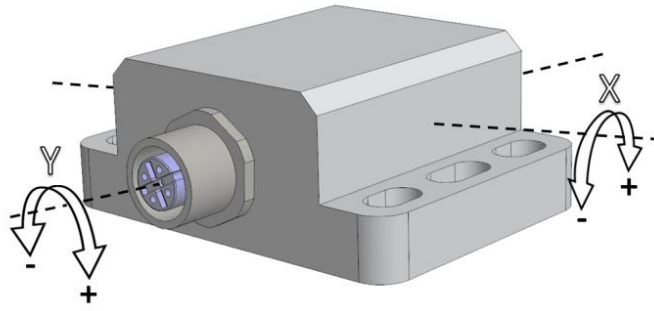
Note: The specifications specified by (*) vary depending on the model selected. The detailed code table for product selection is shown on page 5.

CANopen SPECIFICATIONS

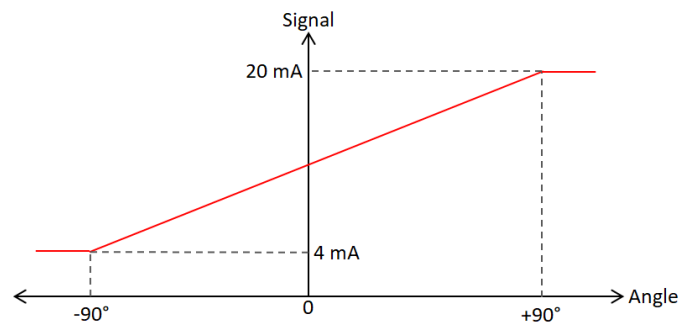
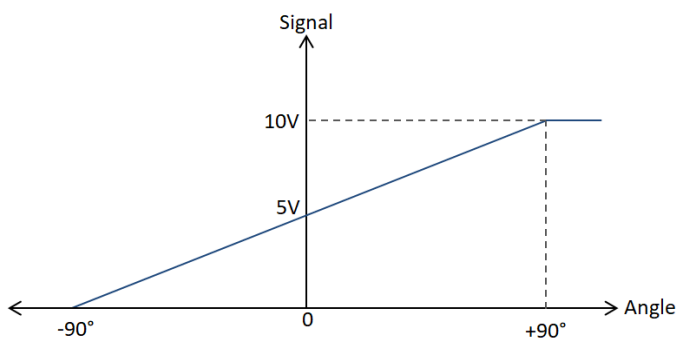
Communication profile	CiA 301
Response Rate Frequency	10 Hz.
Device Type	CANopen, CiA DS410
Node ID	Between 1 and 127, it can be adjusted with LSS or SDO
Baud Rate	10 kBit/s, 20 kBit/s, 50 kBit/s, 100 kBit/s, 125 kBit/s, 250 kBit/s, 500 kBit/s, 800 kBit/s, 1 Mbit/s
PDO Data Rate	100 ms
Error Control	Heartbeat, Emergency Message
PDO	1 Tx PDO
PDO Modes	Event/Time triggered, Synch/Asynch
SDO	1 server
Position Information	Object Dictionary 6004
Termination Resistance	Optional, specify at the order stage.

AXES AND SIGNAL OUTPUT DIAGRAM

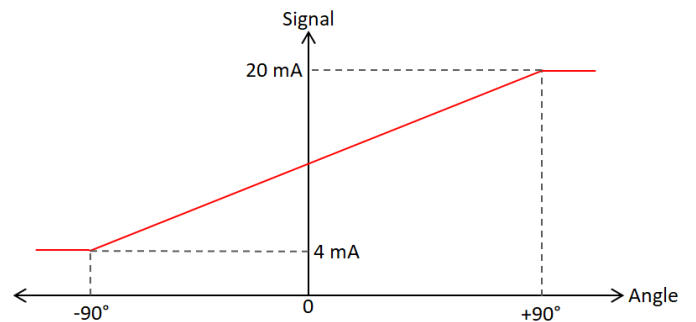
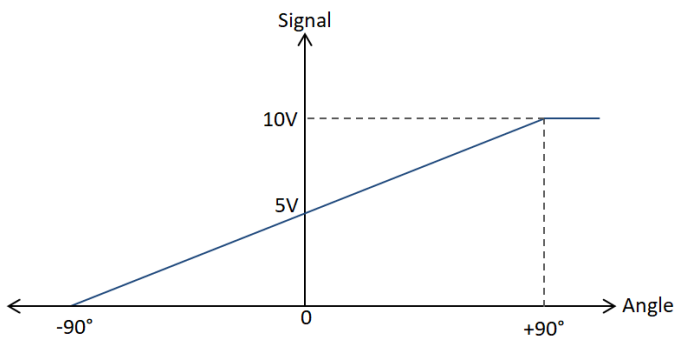
Dual Axis ($\pm 90^\circ$)



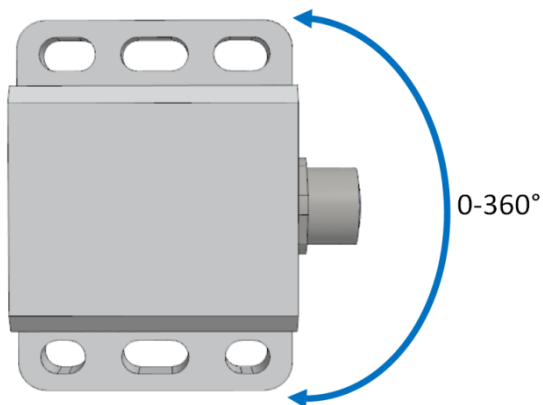
X Axis-Analog Signal Output



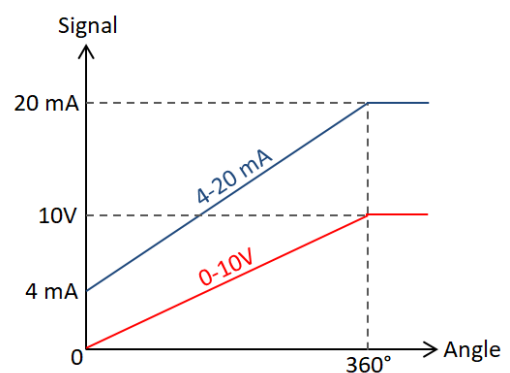
Y Axis-Analog Signal Output



Single Axis (360°)



Analog Signal Output



ELECTRICAL CONNECTION

Analog

Signal	M12 Socket	Cable
V+	Pin 1	Red
Output1 (Analog current/voltage) (X axis)	Pin 2	Yellow
GND (0V)	Pin 3	Black
Output2 (Analog current/voltage) (Y axis)	Pin 4	Green
Reset	Pin 5	Pink

* Output 2 is only used on two-axis models. On single-axis models, Pin 4 (green cable) is empty.

* On analog output models, 1 pcs M12 5 pin male socket is used as standard.

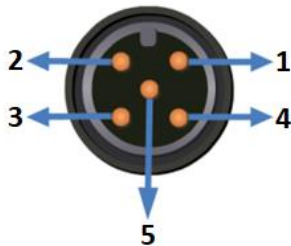
* Different socket models can be requested optionally.

DETERMINING THE 0° POINT OF SENSOR

Pin 5 (pink cable) and pin 3 (black cable) are short-circuited once and then disconnected. Thus, the sensor recognizes that the position is 0°. If the same operation is repeated a second time, the sensor is reset to the factory settings.

During the operations, the sensor position should be kept constant for approximately 4 seconds.

M12 5 Pin Male Socket



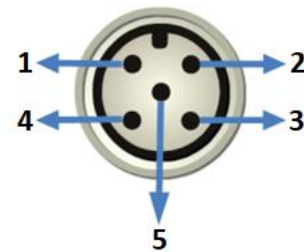
CANopen

Signal	M12 Socket	Cable
CAN_SHIELD	Pin 1	Mesh
V+	Pin 2	Red
GND (0V)	Pin 3	Black
CAN_H	Pin 4	Yellow
CAN_L	Pin 5	Green

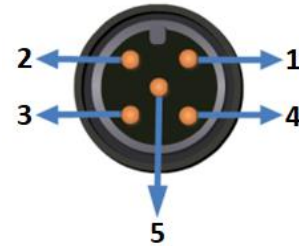
* CANopen models have 2 outputs. 1 pcs M12 5 pin male and 1 pcs M12 5 pin female sockets are used as standard.

* Different socket models can be requested optionally.

M12 5 Pin Female Socket



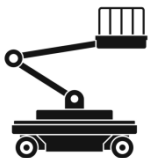
M12 5 Pin Male Socket



SAMPLE APPLICATION AREAS

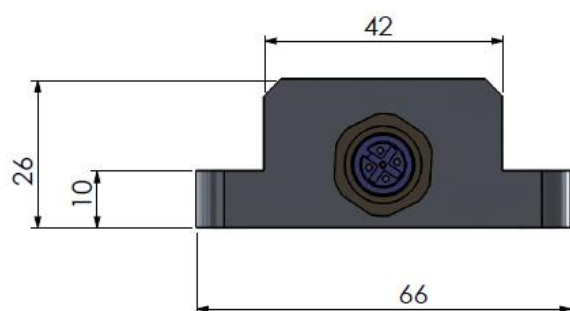
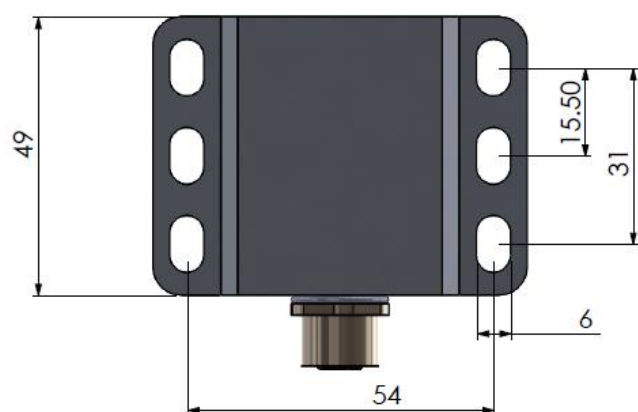
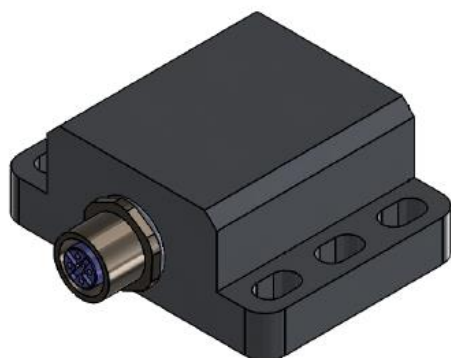
- Agricultural and forestry machinery
- Construction machinery and special-purpose vehicles
- Solar thermal energy and photovoltaics

- Automated guided systems
- Crane and lifting technology
- Wind power plant

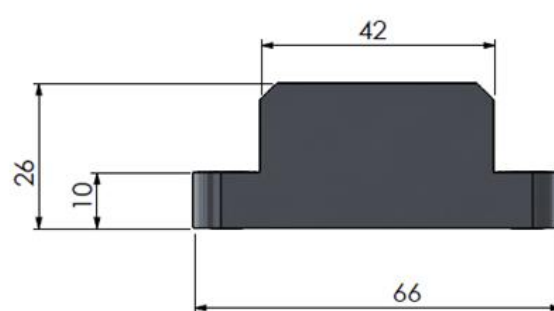
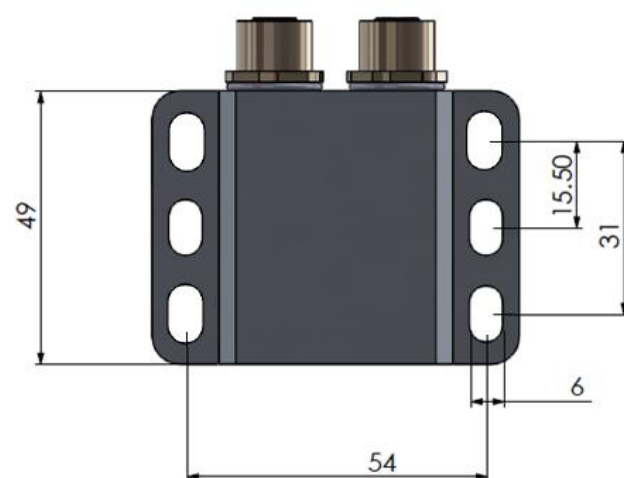
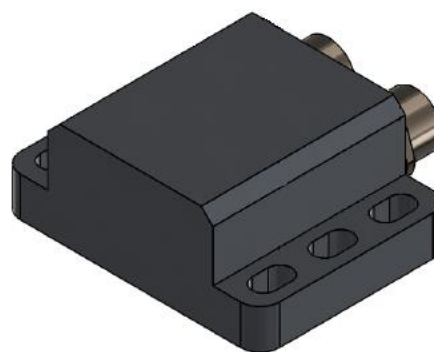


MECHANICAL DIMENSIONS (in mm)

Analog



CANopen



ORDER CODE

Model	Number of Axis			Supply Voltage ⁽³⁾		Output Signal Direction		Output Type
INC 110	01: Single Axis 02: Dual Axis			PP: 12...24VDC / 15...24VDC		CW: Clockwise CCW: Counter-Clockwise		No code : Single Output
INC 110	XX	XX	XX	XX	X	XX	XX	XX
Sensor Type ⁽¹⁾			Measurement Range ⁽²⁾		Output Signals		Electrical Connection ⁽⁴⁾	
E: Inclination A: Angle			-90...+90: -90°...+90° -45...+45: -45°...+45° 360: 0...360° 180: 0...180°		V: 0-10 VDC V1: 0-5 VDC A: 4-20 mA C: CANopen		3M : 3m cable 5M : 5m cable 10M : 10m cable S13F : M12 5 pin female socket S13M : M12 5 pin male socket S13FM: M12 5 pin female + M12 5 pin male socket (CANopen models)	

(1) If sensor type is selected as inclination, the number of axis can be selected as single or dual, and the measurement range can be selected as $\pm 90^\circ$.

If sensor type is selected as angle, the number of axis can be selected as single, and the measurement range can be selected as 0-360°.

(2) Optionally, different measurement values between $\pm 90^\circ$ for inclination sensors, and 0-360° for angle sensors can be requested. You should specify

your non-standard measurement value at the order stage.

(3) The supply voltage is 12...24VDC for CANopen and 4-20 mA output models, and 15...24VDC for 0-10 VDC and 0-5 VDC output models.

(4) The product can be requested with cable or socket.

As standard;

For analog output models, 1 pcs M12 5 pin male socket (S13M) is used.

For CANopen output models, 1 pcs M12 5 pin female + 1 pcs M12 5 pin male socket (S13FM) is used.

However, different socket combinations may be requested as in the examples below.

Please contact us for any other socket model other than M12.

Sample Code 1: INC110 E 01 -90...+90 PP A CW S13F

INC 110 series, inclination, single axis, -90°...+90° measurement, 12-24VDC supply, current output, clockwise, 1 pcs M12 5 pin female socket

Sample Code 2: INC110 E 02 -45...+45 PP C CCW S13FM

INC 110 series, inclination, dual axis, -45°...+45° measurement, 12-24VDC supply, CANopen output, counter-clockwise, 1 pcs M12 5 pin female + 1 pcs M12 5 pin male socket

Sample Code 3: INC110 A 01 180 PP C CCW S13M

INC 110 series, angle, single axis, 0...180° measurement, 12-24VDC supply, CANopen output, counter-clockwise, 2 pcs M12 5 pin male socket